Machine tools Technologies

Advanced Laser Cleaning Robotic Work cells Turbocharge Industrial Processes

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Enclosed robotic laser parts cleaning systems are poised to remove rust and contamination safely, as well as condition, surfaces at dramatically higher volumes and lower costs than conventional methods

Today, advancements in industrial laser cleaning automation show great promise in **boosting productivity** and safety when **rust** and **contaminant removal** or **surface preparation** is required for higher volumes of components and equipment.
Specifically, combining **lasers** and **advanced robotics** within enclosed work cells enables operators to efficiently and repeatedly clean components of different sizes, shapes, and materials on a level previously unattainable through manual methods.

Cost-Effective and Safe Solutions

«Automated laser cleaning systems are designed to **cost-effectively clean** high volumes of even the largest format parts and equipment and can be tailored to suit the size and complexity of the parts while eliminating concerns over operator safety», says Wayne Tupuola, CEO, of Orlando, Florida-based Laser Photonics (NASDAQ: LASE), a leading global industrial developer of laser systems for cleaning and other material processing applications.
Industrial manufacturers frequently need to remove corrosion, grease, residue, and old coatings, or roughen the surface of metals before coating components and equipment. At times, **contaminants** or **toxic substances must be eliminated** before further processing.
The challenge is that conventional methods like sandblasting, dry ice blasting, and chemical stripping are messy, time and labor-intensive including preparation and cleanup, and require costly consumables. These methods can also pose risks to applicators and the environment so regulators like OSHA and EPA scrutinize them.

Efficiency of Laser-Cleaning Robotic Cells

As a much more efficient alternative, a **laser-cleaning robotic work cell** usually consists of at least one laser-wielding robot, controllers, and safety equipment in a custom, see-through enclosure. These collaborative robots, or cobots, excel at tasks like **laser cleaning** parts that involve repetition, freeing up employees to work on other activities.

The **CleanTech Robotic Cell** from Laser Photonics, for example, utilizes a **robotic arm** that holds a "laser gun" with cleaning, roughening, and finishing capabilities. The robotic arm is **programmable via** a **tablet/controller** where the operator would input the

coordinates for material processing. The **cleaning laser** can be **replaced** with a **welding** or **cutting laser**. If required, the work cell can be split into two sections – the robot cleans on one side, while an operator installs a part to be cleaned on the other side.

Cnc milling machine. Processing and laser cutting for metal in the industrial. Motion blur. Industrial exhibition of machine tools.

«The operator can lay out several components for cleaning over the flatbed, set the cleaning coordinates, and leave the robot processing», explains Tupuola.

He points to advancements in laser technology that complement and expedite the efficient cleaning of such shapes.

«Dual-axis laser technology enables the cleaning of target areas more effectively and quickly if they are complex and uneven», adds Tupuola. «Plus, our proprietary technologies allow the laser to move in various directions and clean hard-to-reach areas».

Manufacturers of larger format components can find **useful laser systems** like Laser Photonics' CleanTech Titan FX, which offers up to a 6' x 12' work envelope for automated laser cleaning, rust removal, and surface conditioning. This industrial, turnkey laser cleaning giant can operate as a standalone unit or be easily integrated into a production line environment.

«Large format automated laser cleaning systems can expedite the processing of [applications like] automotive tire rims, molds, oil and gas flanges, or even sheets for the hull of a ship or other vessel,» says Tupuola. He notes that the **size** and **configuration** of the enclosures **can be customized** to accommodate the size and nature of the parts that require cleaning, with the lasers operating at a range of power levels.

Improved Safety

Another significant benefit to such automation is improved operator and environment safety.

«For extra safety, our custom-tailored automated laser systems are enclosed in a Class I safety work cell. We can also integrate dust and residue collection, as well as a fume extractor that captures vapors during the cleaning of toxic substances,» says Tupuola.

This type of advanced laser cleaning equipment is designed to **accommodate** rigorous **safety regulations**. As an example, Laser Photonics' CleanTech systems can help businesses achieve compliance with OSHA regulations and make environmentally responsible decisions following EPA's waste management guidelines.

Abrasive sandblasting involves forcefully projecting a stream of abrasive particles onto a surface, usually with compressed air or steam. The **silica sand** used in abrasive blasting typically fractures into fine particles and **becomes airborne**, which can cause serious or

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fatal respiratory disease. Particles from the coatings, plating, anodizing, corrosion, and even lead paint being removed can also be inhaled. To avoid breathing in particulates, **operators must wear full HEPA suits** when sandblasting.

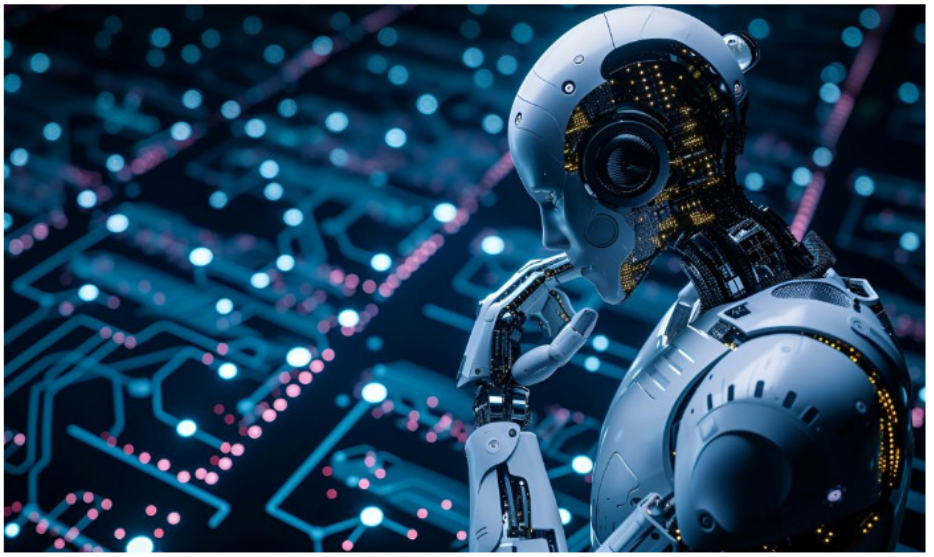
With chemical stripping, harsh chemicals are used to strip metal-based objects of paint, rust, and other contaminants to bare metal – potentially exposing operators to corrosive acids and noxious chemical fumes. In addition, **disposing** of **toxic chemicals is costly** and closely regulated. Laser cleaning seeks to solve or minimize these issues.

Advantages of Laser Cleaning

Unlike conventional methods, **laser cleaning systems require no consumables** other than electric power, minimal labor, and minimal maintenance. The longevity and low-maintenance design of these industrial-grade robotic laser cleaning systems further add to their value, increasing ROI, and making replacement unnecessary for decades.

Programming the laser ablation procedure with a **cobot work cell** can be accomplished with a touchscreen. Generally, **programming** includes **setting coordinates** for the sample, ablation pattern, power output, and cleaning speed, according to Tupuola.

«Installation and programming are needed, but once it's set up, robotic cell cleaning is fast, precise, thorough, and controlled. So, it's a very convenient, optimized process if the parts being cleaned are the same,» says Tupuola.



arafed robot with headphones on talking on a cell phone

Tupuola adds that **Laser Photonics** is now **working** on **integrating 3D scanners** into the robotic work cell. This would automate the focusing of the laser and eliminate some of the programming now done by an operator.

While precision laser-based systems have been effectively used to remove rust, residues, contaminants, and paint, this approach commonly involves manual labor. Automated robotic laser cleaning systems provide manufacturers with safer, easier, and more eco-friendly options.

To meet demand more efficiently, a **growing number of manufacturers** across a wide range of industries will increasingly **turn** to these **laser systems** to **cost-effectively clean** higher volumes of components with the control and speed required for decades to come.

TAGS cutting laser | laser cleaning | robotic cells | welding